

## PREPARATION OF SELF-ASSEMBLED MONOLAYERS ONTO GOLD USING BUNTE SALTS

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Organic thiosulfates (Bunte salts) have been lately<sup>1-3</sup> used instead of thiols and disulfides for formation of self-assembled monolayers on gold surface. Use of Bunte salts offers some distinct advantages over the latter two other kinds of surface-active compounds. Bunte salts can be prepared in a one-pot synthesis and the product is obtained as a crystalline, odorless salt that is easily separated from reaction mixture. Bunte salts are also more soluble to water than the corresponding thiols and disulfides.

In this study we were researching adsorption kinetics of sodiumoctanethiosulfonate from mM range aqueous solutions onto polycrystalline gold surface. Monolayer formation was followed by using double layer capacitance as an indicator of progress of monolayer formation. Double layer capacitance was determined by impedance method. A small AC-voltage was superimposed on DC-voltage supplied by potentiostat. At 1000 Hz frequency imaginary current component measured with lock-in-amplifier is dependent on capacitance of system.

Double layer capacitances were calculated from imaginary currents. For calculation of adsorption rate constants simple exponential decay function was fitted to imaginary component of current. It was found that adsorption rate constants  $k_{\text{obs}}$  for Bunte salts are of about same order of magnitude ( $10^{-4} - 10^{-3} \text{ s}^{-1}$ ) as for disulfides. It is also clear that Langmuirian adsorption isotherm cannot be used for totally satisfactory interpretation of results. Better models will be used later when the mechanism of the adsorption is clarified.

The exact mechanism of Bunte salt adsorption is still somewhat unclear. During adsorption of organic thiosulfates on gold surface metal thiolate film similar to one prepared of thiols is formed. This means that the cleavage of S-SO<sub>3</sub> bond has to occur and sulfite ion leave the surface as no -SO<sub>3</sub> can be detected on gold surface.

[1] Jukka Lukkari, Minna Meretoja, Ilkka Kartio, Kari Laajalehto, Markku Rajamäki, Mia Lindström, and Jouko Kankare, *Langmuir* 15 (1999) 3529-3537.

[2] Young-Seok Shon, Stephen M. Gross, Brent Dawson, Marc Porter, and Royce W. Murray, *Langmuir* 16 (2000) 6555-6561.

[3] Chen-Chan Hsueh, Mong-Tung Lee, Michael S. Freund, and Gregory S. Ferguson, *Angew. Chem. Int. Ed.* 39 (2000) 1228-1230

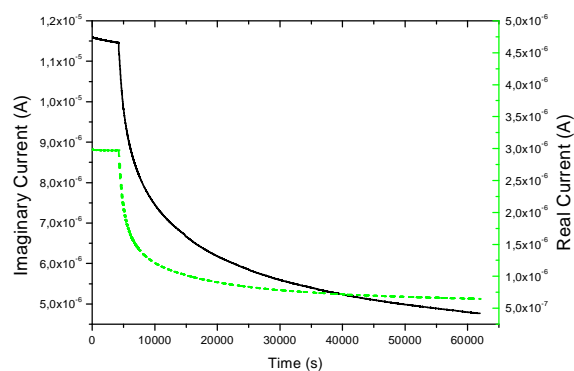


Figure 1. Adsorption of sodiumoctanesulfonate (C8-Bunte) onto polycrystalline gold surface from 1 mM aqueous solution. Temperature 25 °C; Electrode potential 0 V vs. SSMSE.